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Foreign AGRICULTURE

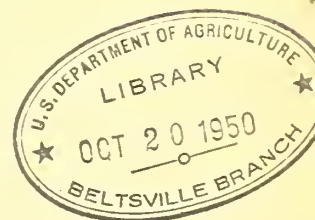
A REVIEW OF FOREIGN FARM POLICY, PRODUCTION, AND TRADE

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Agriculture in São Paulo, Brazil

by HENRY W. SPIELMAN *

Brazil has supplied large quantities of agricultural raw materials for the common cause of the United Nations. The bulk of these materials have been foodstuffs, feedstuffs, and fiber products. In 1944 Brazil shipped more coffee to the United States than during any previous year. Large quantities of oil cakes and meal, oilseeds, vegetable oils, rice, beans, meat and meat products, cocoa, and medicinal products have been shipped to the United Nations since 1940.

The State of São Paulo has furnished a large part of these products. It is the principal agricultural State of the country and produces a greater variety of products than any other State—probably more variety than any other Latin American country, except Argentina and possibly Mexico.

Introduction

São Paulo, although by far the greatest industrial State in Brazil, has primarily an agricultural economy. The 1940 census classified as rural approximately 56 percent of São Paulo's 7,261,000 people. In 1942 the value of livestock and livestock products sold was estimated at \$9,796,000. The Secretariat of Agriculture estimated the 1942-43 value of field crops produced for sale at \$277,921,000, making a total market value of about \$287,717,000.

São Paulo agriculture is characterized by its great diversity. More than 110 crops and 20 types of livestock and livestock products are produced for sale in the State. They include a wide range of tropical and subtropical fruits, vegetables, grains, and fibers. It is Brazil's leading State in the production of cotton, coffee, rice, castor-beans, oranges, bananas, mint, and pineapples.

The following comparisons illustrate the wide diversity of agricultural production in São Paulo. This State, despite its relatively small size (fig. 1), produces more cotton than all other Brazilian States combined and is exceeded only by Texas in the United States; it has more coffee trees than all the rest of Brazil and more than the combined total of Colombia, Venezuela, and Salvador, the other three outstanding coffee countries of the Western Hemisphere; it produces more sugarcane than Louisiana and Florida combined; São Paulo's total orange production is about the size of Florida's production of the Valencia type and is exceeded only by Florida and California in total production; its corn produc-

tion was slightly under that of Wisconsin in 1941 but more than that of Pennsylvania or Georgia; and its rice production is only slightly under that of Louisiana and considerably more than that of Texas or Arkansas. (See table 1.)

Intensive agriculture in the State is young and still in the pioneering stage. By far the greater part of the farming activity has been regarded as a commercial enterprise rather than merely a means of subsistence.

São Paulo has an area of 95,074 square miles or about 60,847,000 acres. It is the size of the State of Oregon or of Louisiana and Arkansas combined. There are large areas unsuitable for cultivation, particularly in the rugged mountains in the eastern part and a broad central belt, whose soil is poor. Areas unsuited for agricultural purposes constitute about 40 percent of the total area. (See fig. 2.)

The western third of the State has been opened for agricultural development during the last 25 years. The great forest areas are being cleared and planted to coffee and row crops. There is a common pattern among farming systems in this region. The land is cleared and planted to rice and corn for 1



FIGURE 1.—Map of Brazil, showing location of States.

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TABLE 1.—Estimated area planted, production, and commercial value of specified agricultural products in the State of São Paulo, Brazil, 1942-43

Product	Area	Unit	Production	Value
	1,000 acres		1,000's	1,000 dollars
Seed cotton	3,630	Bales	1,582	103,107
Coffee	3,424	Short tons	1,800	
Rice	962	132-pound bags	9,467	61,793
Corn	1,881	Bushels	36,358	26,936
Sugarcane	301	Bushels	48,376	26,760
Potatoes	79	Short tons	2,627	13,934
Castor-beans	182	Bushels	9,163	10,180
Beans	569	132-pound bags	1,910	6,862
Manioc	216	Bushels	7,256	6,808
Vegetables	96	Short tons	1,630	4,829
Oranges	121	Boxes	12,155	3,484
Peanuts	91	1,000 pounds	133	3,309
Bananas	126	Stems	18,183	2,984
Alfalfa	14	Short tons	85	1,980
Grapes	12	Short tons	26	1,469
Tobacco	11	1,000 pounds	76	899
Ramie	12	Short tons	3	767
Tung	12	Short tons	5	490
Tea	2	Short tons	1	462
Tomatoes	1			277
Mint	1		(¹)	212
Other fruit	5			123
Wheat	3	Bushels	36	115
Sisal	1		(²)	45
Figs	(³)			26
Pineapples	4	1,000 fruits	1	21
Onions	4	100-pound sacks	16	19
Garlic	1			18
				13
Total	11,761			277,922

¹ Cottonseed; Department of Vegetable Production, Secretariat of Agriculture, São Paulo, Brazil.

² Sugar and Alcohol Institute, Rio de Janeiro.

³ Less than 500 tons.

⁴ Less than 500 acres.

Compiled from a summary published in report by Secretary of Agriculture to the Interventor of the State.

or 2 years and then is planted to cotton for 5 to 10 years, after which time it is planted or seeded to pasture. On the ridges where coffee is grown, it is planted the first year after the land is cleared.

Farming in this region is an extreme form of exploiting the soil. The land is worked hard—mined—as long as it produces large crops profitably, after which it is planted to pasture or abandoned, and growers move on to new regions.

A common agricultural operation in São Paulo, which is uncommon in the United States, is the interplanting of crops. Most of the coffee in the State is interplanted with a summer crop of beans, and often corn, cotton, or castor-beans grow between rows of coffee trees. Cottonfields are frequently planted to four rows of cotton and one row of corn. Sometimes peanuts are planted between rows of cotton. Corn is frequently planted between rows of young coffee trees; after the corn is harvested, a crop of beans is planted.

Natural Features

TOPOGRAPHY

The altitude of the State of São Paulo varies from sea level to over 6,000 feet. In the coastal area

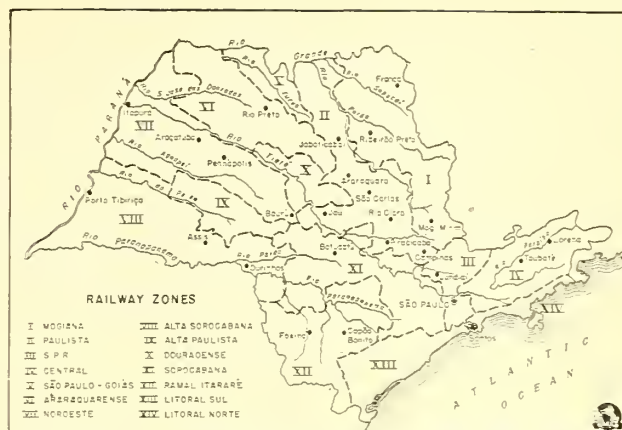


FIGURE 2.—Reference map of State of São Paulo, Brazil.

there are hot, humid, tropical regions, although only a short distance inland rises the Serra do Mar, with its cool humid climate, and beyond the Paraíba Valley the Serra da Mantiqueira rises somewhat higher than the Serra do Mar.

West of these two mountain ranges, which roughly form the eastern and southeastern boundaries of the State, is an interior plateau, comprising most of the State, which slopes to the west toward the Paraná River. The entire plateau region is rolling to roughly rolling, with only a few small areas of level land. It is interspersed with hills rising from 2,400 to 3,000 feet in the central part of the State.

CLIMATE

Two-thirds of São Paulo lies within the Torrid Zone, but because of the high altitude much of the State has a subtropical climate. In the interior the climate varies greatly from winter to summer. During the summer months the days are hot and the nights cool. During the winter the nights are cold, but on sunshiny days the weather is hot, particularly from about 11 to 2 o'clock. There is a gradual change between the two extreme seasons, during the spring and fall, when it is relatively dry and cool.

The rainfall distribution is much the same as in the United States; that is, heavy rainfall during December, January, February, and March, and light during June, July, and August. The principal difference is that the rains in São Paulo come during the summer months and the droughts during the non-growing winter months.

In spite of the subtropical climate, there is a definite growing season. Most crops are planted from the latter part of August through mid-November and are harvested from February through June. Perennials stop growing in the late fall, after March 15, and begin growing again the latter part of Sep-

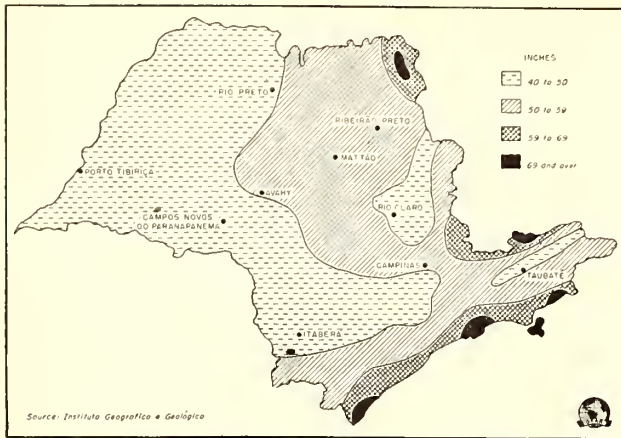


FIGURE 3.—Map of the State of São Paulo, Brazil, showing distribution of average annual rainfall.

tember. The growing season is not limited by killing frosts, since in most years such frosts do not occur. It is quite common to have temperatures between 40° and 45° Fahrenheit during June, July, and August, and they frequently drop several degrees lower. The small amount of moisture received from May to mid-September restricts plant growth during that period.

The average rainfall for the State is 58.4 inches. In the agricultural region it varies from 40 to 60 inches, which is more than adequate for most crops, even upland rice. (See fig. 3.)

SOILS

Four soil types, constituting 26 percent of the State's area, support its agricultural economy, according to officials of the State Secretariat of Agriculture. On these soils practically all the coffee, cotton, sugarcane, and a large part of the rice, beans, and corn are grown. The famous red soils, including a shallow red clay soil and a deep purplish-brown clay soil, are used primarily for coffee. Unfortunately for the economy of the State, they have been planted to coffee for 50 to 80 years, which is about the maximum length of time coffee can be grown on clay soils. Therefore the land now must be planted to other crops, such as cotton, sugarcane, pasture, and corn. A shallow red clay soil, constituting 6 percent of the area of the State, is found on roughly rolling topography, too steep for planting row crops economically. It was first planted to coffee but is now being planted to pasture—literally planted, since over half of the pastures are started from grass roots planted by hand. During the last 10 years growers have been planting their old, deep purplish-brown, clay-soil lands to cotton and pasture and during the 1944-45 season to corn.

The deep sandy and shallow sandy soils found in the western third of the State were originally covered with dense forests under which a thick blanket of organic material accumulated. As these forests were cut and the land planted to cotton, the organic material rapidly disappeared, because the heavy rainfall and long period of hot weather were ideal for the development of the organisms that destroyed it. These soils are exceedingly productive for 10 to 25 years, depending on the treatment they receive. If planted to a clean-culture, row crop, such as cotton, the soil fertility is depleted within 10 years; if planted to coffee, the soil fertility is not depleted for from 20 to 25 years.

All the soils in the State are subject to serious erosion. It is worse on the sandy soils, where gullying occurs soon after the land is cleared and planted to crops. Erosion control is probably São Paulo's most serious problem from the standpoint of future agricultural production.

Population

São Paulo is the second most thickly populated State in Brazil, second only to small Rio de Janeiro. In 1940 there were 7,261,000 people, of whom 4,046,000 were classified as rural. According to the 1940 census, the city of São Paulo, with a population of 1,269,000, was the third largest city in Latin America and the eighth largest in the Western Hemisphere. Since 1940 it has grown rapidly, and the present population of the metropolitan area is estimated by the city-county manager at approximately 1,900,000.

Major Land Uses

Data published by the State's Department of Statistics indicates that approximately 60 percent of São Paulo's land is in farms and ranches. The other 40 percent represents mountains, swamps, brushlands, and areas of poor soil that are not used for agricultural purposes. Of the 60 percent in farms and ranches, 28 percent is cultivated, 43 is in pasture, and 29 percent is in forest and woodland.

Only a small part of the area of the State is irrigated. The largest commercial area is in the Paraíba Valley, where irrigated rice is produced. In other areas small vegetable and citrus tracts are irrigated, but no irrigation is used for such crops as corn, cotton, beans, and coffee.

There has been a general shift in the type of agriculture in São Paulo from the east to the west. Coffee production entered the State through the

Paraíba Valley from the State of Rio de Janeiro about 200 years ago. As the land became worn out, agricultural production moved farther west into virgin-forest areas. When the better clay soils were reached, the areas of agricultural production remained stationary for 70 to 100 years before moving farther west. As a result of this exploitative type of agriculture, great areas have been left where only grass can be grown economically. The Paraíba Valley has developed into an intensive dairy region, and some of the other worn-out areas in the east are gradually being shifted from intensive agricultural production to extensive livestock production. In the agricultural belt in the east increasing quantities of fertilizers are being used.

Number and Size of Farms

According to the Department of Statistics, there were during the 1939-40 season 249,881 farms in São Paulo valued at \$270,554,000. During that year less than half of them produced cotton (111,541 farms), or 44.6 percent of the total. In 1942, there were 68,859 coffee farms. No data are available on the number of farms which produce both coffee and cotton. Many growers definitely prefer to produce coffee to the exclusion of cotton, and many cotton farms are located on land not suited to coffee. Considerably less than 200,000 farms in the State produce coffee and cotton, which means that more than one-fifth produce a variety of other products.

In the 1939-40 season over half the farms in the State had less than 60 acres; 93 percent had less than 600 acres. Farmers who had less than 6 acres operated only 0.1 percent of the land. Eighty percent operated 22 percent of the land; 7 percent having the largest acreage farmed nearly 58 percent.

Nationality of Operators

In 1939-40 Brazilians operated 72 percent of the farms, which comprised 71 percent of the land. Although the State of São Paulo is of recent agricultural development, foreign growers operate only a few of the farms and a small percentage of the area. Contrary to an opinion widely held in the United States, Japanese operate less than 5 percent of the farms and only 2 percent of the total area. (See table 2.) Although they are few in number, they have exercised a great influence on agricultural practices, particularly with respect to cotton and vegetable production. Before the Japanese came to the State there were only small quantities of vegetables in the São Paulo city market. They have in-

creased both the volume of production and the quality of practically all types of vegetables.

Farm Tenancy

Over 45 percent of all farms in the State were operated by tenants during the 1939-40 marketing season as compared with North Carolina's 44 percent and Mississippi's 66 percent. Forty-two percent of the cotton farms were operated by tenants that season. Over half the tenants paid cash rent, and the others paid one-third or one-half of the crop. According to the Department of Statistics, cash tenants paid from \$1.30 to \$16.67 per acre as rent. Sixty-four percent paid less than \$1.70 per acre; 30 percent paid between \$1.70 and \$3.35 per acre. Rents have gone up considerably since the 1939-40 season. In 1943, in one of the principal cotton regions of the State, tenants paid \$3.35 per acre for land valued at \$13.00 per acre. Although this rate seems excessive, the land is generally exhausted after 7 years of cultivation. Other rental conditions for cash tenants varied considerably among farmers interviewed in 1943. In general, it was observed that about half the cash rent was paid in advance and the other half during harvest. Sometimes the owner advanced commodities or credit and arranged medical service. In cases where the tenants needed hired labor, the owner sometimes advanced money for it.

The share tenant, as in the United States, furnishes his own equipment and some of his operating capital. Sharecroppers are usually without funds and equipment. The owner plows the land, furnishes the necessary tools and a cash allowance, or makes credit arrangements with a nearby store for the operator. Both share tenant and sharecropper frequently receive cash advances or credit from the owner. The custom is not to charge interest on these advances. The owner frequently exercises little control over the crops produced by the share

TABLE 2.—Percentage of farms and area operated by various nationalities in the State of São Paulo, Brazil, 1939-40

Nationality	Number	Area
	Percent	Percent
Brazilian.....	71.6	71.3
Italian.....	10.9	9.3
Spanish.....	5.3	3.1
Japanese.....	4.6	2.1
Portuguese.....	4.0	3.1
German.....	1.1
English.....	1.0
Others.....	3.6	9.0
Total.....	100.0	100.0

Estatística Agrícola e Zootécnica, 1939-40, State Department of Statistics, São Paulo, Brazil.

tenant, but he dictates the crop program to the sharecropper.



FIGURE 4.—Plowing in the eastern part of the State is sometimes done with oxen.

Agricultural Labor

In 1939 there were about 205,000 families of *colonos*, 136,000 *camaradas*, and 621,000 *enzadas* working on São Paulo farms. A *colono* is a rural worker under contract for long periods of time, generally 1 year. He is in charge of cultivating a given area and receives not only a contract price but also a percentage of what he produces. Generally, he is given a plot of land on which to raise rice and beans and a pasture for his animals. The entire family helps with the work. A *camarada* is an individual rural worker who is paid by the day, the month, or by the job. An *enzada* is a hoe hand. He is usually referred to as a *camarada* and is generally a member of a *colono* family.

Systems of labor in São Paulo, like farming operations, may be divided into two general classifications: Those in the old zones and those in the new zones. In both regions men do most of the work that requires the use of animals, such as plowing, marking row, planting with the mechanical planter, cultivating, and hauling products on the farm and to the market. In the old zones a larger proportion of the hand labor is done by women and children than in the new zones. They do, by hand, the planting, hoeing, thinning, and a large part of the harvesting. In the new zones the men do many of the jobs requiring hand labor, because there is little use for animals, except for hauling products.

The entire family helps with the work in coffee groves. Data from the Brazilian National Coffee Department show that 314,276 men, 159,340 women, 95,445 boys, and 76,532 girls were working in coffee

in 1942. During the growing season their work consists mainly of keeping the weeds down, which is done with a hoe. The family also helps with harvesting.

Day-labor wages vary considerably, depending on the competition of other agricultural products and industries and the possibility of laborers developing farms of their own in the new sections. During the 1943-44 season they varied from \$0.50 to \$1.25 without food and from \$0.30 to \$0.80 with food.

Principal Commercial Crops

COFFEE

Coffee has been the keystone of São Paulo's economy since the latter part of the nineteenth century and has been the principal factor in the development of the agriculture of the State. Coffee was first grown in São Paulo in the Paraíba Valley about 200 years ago. As the soils in that region became exhausted, coffee moved into the fertile interior plateau, principally to the famous red lands, where it has continued to expand over the past 70 years. The number of producing trees in the State continued to increase until 1932-33, when the young trees, planted during the period of good prices in the 1920's, came into production. After 1932-33 the number of trees decreased steadily until 1940-41. Because of the Inter-American Coffee Agreement prices were raised, and growers again found it profitable to increase the number of their trees.

During the heyday of coffee production, this product accounted for 90 percent of the total exports of the State. Although coffee exports have decreased both in quantity and in value since 1932, coffee still remains the principal export of the country. Following the low prices of the period 1929-33, growers gradually shifted to the production of other products, such as cotton, corn, rice, and citrus fruit.

Coffee is grown in São Paulo on practically every type of soil and under a great variety of climatic conditions. The primary consideration in the selection of a site for a coffee grove is to locate it where there is little danger from frost or cold winds. Preference is given to land on the tops of mountains and ridges on the northeastern and western slopes. Southern slopes are avoided because of the cold south winds and valleys because of frost.

The quality of coffee varies greatly because of the variation in soil and climatic conditions. In the Mogiana region in the northeastern corner of the State, where a large amount of the production is at

high altitude and on the red soils, the flavor usually is soft and strictly soft. In other zones, such as the sandy Sorocabana, Alta Paulista, and Noroeste, the flavors are harder.

There are two principal varieties of coffee grown in São Paulo—Bourbon and Comum. The latter is grown primarily in the Mogiana zone; the former is grown in other parts of the State. Other varieties, grown on a small scale are Amarelo de Botucatú, Maragogipe, Alipio Dias, and Sumatra. It has not been determined yet which are the best varieties for the different zones of the State.

Coffee is planted during the months of September and October, soon after the rains begin. If a new grove is planted, the beans are planted directly in the field, and the young plants receive little protection from the hot sun, except from some such crop as corn, which is interplanted between rows of coffee. A recent practice is to cover with sticks the newly planted coffee. When replanting, seedlings are grown 1 year in a nursery and set out during the early part of the rainy season, usually in holes made by the old coffee trees. When a new grove is being started, the young trees are interplanted with corn, beans, rice, and sometimes castorbeans or cotton. These other products are produced for sale, as well as for home consumption, so that the farm yields some income before coffee comes into production. Generally coffee begins to produce during the fourth year and continues to bear for 20 to 80 years, depending on the fertility of the soil and the care given the trees. After coffee begins to produce, usually nothing is planted between the trees. Some growers permit their laborers to plant first-crop beans, which are grown during the wet season and are used primarily for home consumption. In order that the farm income may be maintained in years when coffee has been damaged by a freeze, cash crops sometimes are planted between the coffee trees.

Most coffee is worked by families who contract to care for the trees during the following season for a fixed amount per thousand trees and a small plot of land on which to raise foodstuffs. During the 1944-45 season most contracts were being made for about \$22.50 per thousand trees. A family of four can care for 10,000 trees. The care of the trees requires full-time labor by the family from the latter part of September to the beginning of the harvest period about the last of May. Family labor usually harvests the coffee at a fixed rate per sack.

In 1942 there were about 65,500 farms in the State on which coffee was a commercial enterprise. These farms occupied about 18,633,000 acres which were divided as follows:

	1,000 acres
Coffee.....	3,497
Other crops.....	6,490
Weeds and forests.....	2,906
Pasture, wasteland, and farmsteads.....	5,740
Total.....	18,633

Source: D. N. C. Bulletin XII, No. B1, May 1944, Rio de Janeiro.

Coffee exports from the port of Santos averaged 9,575,000 bags during the 5 years 1938-42. Exports during 1942 were the lowest since before the first World War. In 1943 they increased to more than 7 million and in 1944 were the third largest on record, amounting to nearly 11 million bags.

COTTON

Cotton production in the State of São Paulo has increased continuously since 1930, when production amounted to less than 18,500 bales. In 1930 the State produced less than 5 percent of the total production of Brazil; in 1944 it produced over 75 percent. Production in São Paulo for 1944 has been estimated at over 2,131,000 bales, thus making Brazil the third largest cotton producer in the world. This expansion in production may be attributed largely to the work of Government seed breeders in developing varieties adapted to local growing conditions and to the production of a fiber accepted by spinners throughout the world. In order to take full advantage of the work of the seed breeders, the State Secretariat of Agriculture distributes all planting seed used in the State. The Government also exercises strict control over cotton gins. This service has eliminated antiquated gins and has forced the ginner to keep their equipment in good operating condition.

Cotton is grown in all sections of the State, except in the mountainous areas and in a small region in the northeast corner, where it could be produced.



FIGURE 5.—Fertilizers are often applied by hand.

There are roughly three cotton-producing zones in the State: (1) The old zone comprises the Campinas-Piracicaba-Limeira-Sorocaba region; (2) the cotton-coffee area consists of the Ribeirão Preto-Jaboticabal-Matão region; (3) the new western region comprises the Alta Paulista, which is the most important; Noroeste; Alta Sorocabana; and Alta Araraquarense. For the past 10 years weather conditions have favored cotton growing. Rains begin in the early spring, preparation of the land begins in September, and planting takes place in October and November. During the summer months almost daily rains occur in the cotton-producing regions, but generally there is also considerable sunshine. There are few long periods of continuous rains. The rain ceases the latter part of March; thus, weather conditions are favorable for harvesting clean cotton. Picking generally begins the latter part of March and continues through June.

São Paulo produces exclusively upland-type cotton developed from two United States strains, Texas and Express. These varieties produce cotton varying from $3\frac{1}{2}$ to $1\frac{1}{2}$ inches in staple length. It has recently been accepted in England as the equivalent of the famous "bread and butter" cotton of Texas. This cotton yields from about 100 pounds to well over 500 pounds per acre. The high-yielding regions are in the new zones in the western part of the State.

Most of the cotton is produced on farms that have from 25 to 100 acres in this crop. Few farms have over 100 acres in cotton. Fifty percent or more of the cotton is cultivated entirely or in part by machines; planting is still largely done by hand.

Little fertilizer is used on cotton. Only in the old zones in the eastern part of the State has any appreciable quantity been used. According to the Secretariat of Agriculture, none has been used in the western part.

Exports during the 5-year period 1938-42, from the port of Santos, averaged about 964,000 bales. War operations, both in Europe and Asia, cut off Brazilian markets. Exports in 1943, about 352,000 bales, were the lowest since southern Brazil became an important export area. During 1944 exports increased somewhat, owing to purchases by several neutral countries. During 1944 nearly 525,000 bales were exported, most of which went to the United Kingdom and Sweden.

SILK

Silk production is rapidly becoming an industry of major importance in São Paulo economy. During the 1943-44 season the Silk Institute estimated that

4,850,000 pounds of cocoons were produced in the State, which gave approximately 220 short tons of raw silk (table 4). Although silk has been produced since 1925, only since 1940 has production increased appreciably, largely because of the excellent prices paid for cocoons. Many Government officials and many people connected with the silk industry believe that silk production in the State is a wartime enterprise and will disappear as soon as the former sources of supply are reopened. Officials of the Silk Institute and other members of the silk trade believe that São Paulo silk production will be able to compete with silk from China and Japan, particularly in the Brazilian market, provided the tariff is high enough. Part of the silk produced is consumed within the country and part is exported, largely to Argentina.

TABLE 4.—*Production of silkworm cocoons and silk fiber in the State of São Paulo, Brazil, 1939-43*

Years	Cocoons	Silk fiber
	1,000 pounds	1,000 pounds
1939.....	1,071	84
1940.....	1,203	99
1941.....	1,591	110
1942.....	3,307	313
1943.....	4,850	441

Source: Silk Institute, Campinas, São Paulo.

Silk production is heaviest in the western part of the State, particularly in the Alta Paulista zone. Members of the trade say that Japanese produce at least 95 percent of the total. Few farmers produce silk exclusively. Most have 2 or 3 acres planted to mulberry trees and enough shed space to take care of the worms, which feed on the leaves. Five to seven crops of cocoons are produced per year. Cocoon production, like most other agricultural enterprises in the State, is a family undertaking. All members help in the care of mulberry trees; women and children do a large part of the feeding of the worms under the supervision of the husband. Japanese growers say they are using the same methods used in their home country.

Most growers sell "green" cocoons, which are either dried at a nearby filature or by a local agent with heating equipment in connection with his office. To date most of the filature equipment has been copied from the Italian type. Recently, because of the shortage of metal, a number of old-model wooden Japanese filatures have been built. Estimates recently obtained from the Silk Institute indicate that over 2,000 basins are in operation in the State. The Government through its Silk Institute distributes silkworm eggs and mulberry seedlings to producers at cost (table 5).

TABLE 5.—Silkworm eggs and mulberry seedlings distributed in the State of São Paulo by the Government, 1939-40 to 1943-44

Years	Silkworm eggs	Mulberry seedlings
	1,000 pounds	Thousands
1939-40.....	270	166
1940-41.....	127	444
1941-42.....	265	51,777
1942-43.....	1,313	11,266
1943-44.....	3,848	13,616

¹ From August 1943 to March 1944.

FIBERS

Next after cotton, the most important fiber produced in the State of São Paulo is ramie, a flax-substitute fiber. It is grown in the extreme west, particularly in the Alta Paulista, Sorocabana, and Noroeste railway zones. It grows well on sandy soils but better on newly cleared forest lands which have a high-organic content.

State officials of the Secretariat of Agriculture estimate that about 12,000 acres of ramie were planted during the 1942-43 season from which about 3,000 tons of fiber were produced, practically all of which was consumed by the local textile industry. One of the main handicaps to the production of ramie is the lack of a good machine for processing the fiber.

Papoula de São Francisco is grown in the Paraíba Valley. It is a bast-type fiber used principally in the manufacture of burlap bags. During the 1942-43 season about 3,600 acres were planted to this fiber. About 1,320 tons were produced, all of which were consumed in the State.

According to the State Secretariat of Agriculture, 258 short tons of sisal were produced in the 1942-43 season. A small quantity of *gravatá* fiber is also produced. Sisal and *gravatá* are used in making cord, ropes, and soles of cheap shoes.

TUNG

Since 1930 there has been increasing interest in the production of tung nuts. At present there are approximately 1,000,000 tung trees in the State, and the number is increasing each year. They have been planted on land formerly planted to coffee and also between coffee trees. Tung-nut production in 1943 was estimated at 5,500 tons and in 1944 at 550 tons. The reduction was largely due to the freeze of September 1943, which destroyed most of the tung flowers. All the nuts are crushed within the State by four oil mills. All the oil produced has been consumed by local paint manufacturers.

TEA

In 1942 approximately 1,500 acres of land in the coastal region of the State were planted to tea.

Production during the 1942-43 season was estimated by the Secretariat of Agriculture at about 1,000 short tons. In 1942, 187 tons were exported, principally to Argentina and Chile. All the production is by Japanese growers.

RUBBER

Small quantities of mangabeira-type rubber are produced, particularly in the Mogiana region. The trees grow wild, and to date no attempt has been made to plant any. In 1943, 143 tons of rubber were purchased in São Paulo by the Rubber Development Corporation, but the production of the State is not known.

Field Crops

CORN

Corn is probably the most widely grown crop in São Paulo, and Brazil is the fourth largest corn producer in the world. Corn is grown, primarily for local consumption, in all regions of the State, particularly in the Sorocabana zone. According to State officials, 60 percent of the corn produced is fed to hogs, 30 to work animals, and 10 percent is used for industrial purposes and human consumption.

Both soft and hard varieties are produced. Of the soft varieties the three principal types are Horse Tooth, Golden Dent, and Amarelão. These varieties have a growing period of from 130 to 150 days. They are easily affected by dry spells and damaged by insects. The yield, however, is somewhat higher than that of hard corn. The three principal types of hard corn are Cateto, Crystal, and Assís Brasil. Their growing period is from 100 to 115 days. They are relatively resistant to long dry spells and to insect damage and keep well in storage.

In practically all the zones, corn is produced as a supplementary crop. It is usually planted on the poorest soil. Consequently, yields per acre are low, varying from 16 to 24 bushels per acre. When corn is planted on new land between coffee trees or cotton, it yields about 30 bushels per acre.

The State Department of Statistics reported that in 1940 about 1,171,000 acres were planted to corn, of which about 679,000 were interplanted with other crops. In the old agriculture zones corn is usually interplanted with beans; in the newer zones it is interplanted with castor-beans, rice, cotton, or peanuts.

RICE

Brazil is the leading rice-producing country in the Western Hemisphere, and São Paulo is the leading

State. Rice is grown in nearly all regions, on irrigated land, marshlands, and on dry upland. Practically all the irrigated rice is produced in the Paraíba Valley and in the coastal regions of the south. In 1944 the production of irrigated rice probably amounted to one-sixth of the total for the State. This proportion is higher than usual because of the droughts in January 1944, when upland rice was in flower.

By far the greatest quantity of rice produced in the State comes from the western upland regions, particularly the Alta Paulista, Noroeste, and Araraquarense zones. Rice production there is a transitory enterprise. Land in these zones is being continually cleared to plant cotton and coffee. There is too much nitrogen in the soil, however, to produce cotton satisfactorily the first year, and there are too many stumps, branches, twigs, and logs to produce coffee. Since the soil on this newly cleared land contains a large amount of humus and moisture during the first 2 or 3 years, it is well adapted to the production of rice. Usually rice is the first crop planted in these zones.

There are said to be four principal varieties of rice produced in the State: (1) Jaguarí is a long-grain type produced principally on upland soils; (2) Iguapé is produced on upland soils but grows well in wet areas, along rivers and on irrigated land; (3) Dourado Agulha is the principal variety produced on irrigated land and in marshy areas along the rivers, but it is planted to a limited extent on uplands; (4) Cateto is planted principally on poor soils.

Very little mechanical equipment is used for planting, cultivating, or harvesting rice. Practically all the rice is cut by hand and stacked in shocks for 10 to 20 days to dry. Thereafter the grain is removed by beating against a platform or post. One man can thresh about 5 sacks of 22 pounds per day.

BEANS

Rice and beans are the ham and eggs of Brazil, and practically all Brazilians consume large quantities daily. Beans are grown over the entire State, with no definite areas of concentrated production. There are two crops of beans a year—the wet harvest in January and February and the dry harvest in May, June, and July. At least 18 varieties of beans are grown, but three predominate: Chumbinho, mulatinho, and manteiga. All are medium-sized and light-brown in color.

No farms produce beans exclusively. They are generally planted between rows of other crops, such as corn, cotton, and coffee. In 1939, 95 percent of the beans were planted between rows of other crops.

Most beans are produced by *colonos*, who are allowed to plant them between rows of the principal cash crops for use on the farm and to sell in nearby towns. Usually they keep the entire proceeds from the beans.

Beans are harvested by pulling the stalks up by hand and stacking them in piles to dry. Sometimes the pods are removed by hand, but they usually remain on the stalk until threshed. The most common method of threshing is to spread the beans on coffee-drying ground and beat them with long poles. The beans are separated from broken stalks and pods by throwing them into the air and catching them on sieves.

The dry harvest is usually slightly larger than the wet harvest. Wet-crop production varies from 1 to 6 bags of 132 pounds per acre, and the dry crop from 1 to 5 bags.

SUGAR

The cultivation of sugarcane is concentrated in a few areas. The principal region is around Piracicaba, but sizable quantities are also produced in the north central part of the State, as well as the northeast corner.

The production of sugar is the most mechanized of all agricultural enterprises in the State. Cane land is usually plowed and the cane cultivated with tractor-drawn equipment. None of the sugar mills would be considered modern, compared with the mills of Cuba and other Caribbean islands. They are said to be more modern, however, than most of the mills in the heavy sugar-producing regions of northeast Brazil.

Sugar production in the State is limited by the Federal Government. It is sufficient only to supply the population in the interior of the State. Sugar consumed in the cities of São Paulo and Santos is imported from northeastern Brazil in order to provide a market for the principal cash crop of that region.

Cane is planted during two periods. That planted from September to November is harvested the following May to September; that planted from February to March is harvested 1.5 years later, from May through September.

Most sugar in São Paulo is produced on land owned or controlled by the operator of a sugar mill. At the end of the harvest the laborer on the mill-owned land is paid a fixed amount per ton.

The principal varieties are P. O. J. 213, 2727, and 2828, C. P. 27-139, American F. 27-9, and C. O. 290.

In addition to crystal sugar, between 66,000 and 88,000 short tons of various types of alcohol are produced. About two-fifths of the alcohol produc-

tion is *aguardente*, a cheap alcoholic drink. Most of the other alcohol produced is used for motor fuel.

CASTOR-BEANS

Castor-beans are grown in the new agricultural zones of the western fourth of the State, particularly in the Alta Sorocabana, Alta Paulista, and Noroeste zones. Sizable quantities are also grown in the region of Jaú and Ribeirão Preto. Although they have been grown for a long time, only since 1932 has there been an upward trend in production. At that time the Bank of Brazil agreed to finance the production of castor-beans planted between coffee trees. Later financial assistance was withdrawn, but production continued to increase, particularly during the past 4 years of good export demand.

Castor-beans grown in São Paulo are of the dwarf varieties, particularly Purple Stem Dwarf, Red Stem Dwarf, White, Bloody, and Zanzibar. They are usually planted during the latter part of September or in October. It is considered an annual crop, but recently some producers have been pruning the stalks in the fall and harvesting beans from the same stalks the following year. On small farms, which produce the bulk of the production, castor-beans are grown between coffee, cotton, corn, rice, or beans. On some of the larger farms, particularly in the Ribeirão Preto, Jaú, and Noroeste railway zones, they are grown in large fields planted exclusively to castor.

MANIOC

Manioc is produced throughout the State. It often grows wild, and natives dig up the roots for human and animal consumption. Most of it, however, is produced in fields planted exclusively to manioc. For industrial purposes, it is grown mainly for meal, flour, and, during the past 3 years, for tapioca flour. The tapioca flour produced is of the Java type, and, according to United States chemists, is equal to average-quality Java flour. There is a small production of starch equal to good-quality Java starch. During the past 3 years several modern starch mills have been built. As the workers become acquainted with mill operations, they are expected to produce an increasingly better quality of starch. Some manufacturers hope to continue selling to the United States following the war and are making plans now to compete with Java starch in the United States market.

During the past 4 years large quantities of manioc flour have been produced. Wheat-flour manufacturers formerly were required to mix a quantity of manioc flour, varying from 2 to 15 percent, with

wheat flour, but this requirement was revoked after the agreement with Argentina to supply all Brazil's wheat requirements. At the present time large quantities of manioc flour and meal are being shipped to northern Brazil for food. Manioc meal is sold in the local market in about the same manner as corn meal is sold in the United States, but it is much more widely used in São Paulo than corn meal is in the United States. The roots are sold in the city markets in the same way as potatoes. During the 1943-44 season, the State and Federal Governments encouraged the production of alcohol from manioc roots.

OTHER CROPS

Peanuts are produced in small quantities throughout São Paulo, but in commercial quantities in the western third of the State only. They are generally interplanted with other crops, such as coffee, cotton, corn, and castor-beans.

During the 1942-43 season, officials of the Secretariat estimated that about 10,000 acres were planted to tobacco in the State. All production is consumed locally in the form of home-made cigarettes.

Small quantities of alfalfa hay are grown, particularly in the zone around Charvantes on the Sorocabana railway. Practically all the 1942-43 crop was bought by the Brazilian Army.

The production of mint oil and menthol has been stimulated during the war by buyers in the United States who were no longer able to obtain it from their usual sources of supply. Current estimates indicate that the 1944 production will amount to about 330 short tons of oil and from 250 to 275 tons of crystals, valued at \$7,500,000. Mint is produced largely in the new agricultural regions in the western part of the State, particularly in the Alta Sorocabana. Two cuttings a year are usually obtained, although growers who have old plantations of mint hope to get three cuttings in 1944-45. The area planted in 1944-45 was no doubt somewhat larger than that planted in 1943-44 because of the unusually high prices received for the oil during the past season.

Mint is usually started in seedbeds in August and transplanted the latter part of September or early October, although planting in 1944 continued through January 1945. The first cutting from old plants takes place in December and from new plantings in January and early February. The second cutting is made sometime between the latter part of March and continues to the middle of June. Most growers have made their own distilling equipment, the efficiency of which varies greatly. The menthol content of the oil is from 70 to 90 percent. Practically the

entire production is for the export market, which to date has been the United States.

A number of experiments have been made with the production of medicinal plants. The most effective have been with derris. Experiments in quinine and pyrethrum production have been made by private individuals and Government officials, but as yet there is no significant production of either.

Fruit

CITRUS

Oranges are produced throughout the State of São Paulo. Commercial production is in the Paraíba Valley near Taubaté and Caçapava and in other sections near Limeira, Campinas, Sorocaba, and Araras. In 1943 there were 6,600,000 orange trees. Of the principal types grown in 1939-40, the Baiana constituted 62 percent of the trees, the Baianinha 10 percent, the Pera 18 percent, and Valencia, Natal, Barão, Denia, Pineapple, Hamlin, and Murcia made up the remaining 11 percent.

The grower sells his oranges on the tree or to a buyer who takes only the particular qualities in which he is interested. Both types of buyers furnish boxes and transportation to the packing house. The fruit is washed, scrubbed, dried, polished, and, for export, put into boxes the size of those used in Florida.

During recent years there has been a new disease attacking oranges grafted on sour-orange rootstock. It has destroyed many trees and is still spreading. Growers have been inarching new rootstock and have been planting new trees that are grafted on other types of rootstock. Officials of the Secretariat of Agriculture estimate that 90 percent of the oranges in the State are on sour-orange rootstock, and the other 10 percent are on sweet orange, lemon rose, and Persian lime.

Prior to 1940, São Paulo exported over 2,000,000 boxes of oranges annually, mostly to England. Since 1940 exports have been greatly reduced and have been largely to Argentina and Chile.

In order to utilize the large quantity of surplus oranges, attempts have been made to produce orange oil and orange concentrate. Neither product has been of good quality and therefore has found little market. Small quantities of good-quality orange oil have been sold in the United States, but for the most part the quality is not uniform and is inferior to the oil produced elsewhere.

Small quantities of grapefruit, lemons, and tangerines are also produced in São Paulo. They are grown primarily for local consumption.

BANANAS

Some authorities believe Brazil is the world's leading banana producer. There are 19,000,000 banana trees in the State, according to officials of the Secretariat of Agriculture. Bananas are widespread but are produced for export in the coastal area only. In this region there is a tropical, humid climate and an abundance of clayish soil with a large amount of organic matter. Some plantations are from 12,000 to 60,000 acres in size. Officials of the Secretariat of Agriculture believe the large banana plantations are owned or controlled by foreigners and the smaller plantations are owned by Brazilians. In 1942-43 production amounted to 18,000,000 stems, considerably less than the 1939-40 production of 30,000,000 stems.

Bananas are planted from July 15 to August 31. They are placed in holes about 13 feet apart in all directions. In the coastal region banana trees produce throughout the year and the stems are gathered at intervals of 15 to 30 days, depending on the available labor supply, transportation facilities, and the demand. The principal market type grown is called "banana nanica," a dwarf variety that produces bunches of about 250 bananas weighing approximately 88 pounds.

Most of the bananas produced throughout Brazil are consumed within the country, but of those exported more than 90 percent originate in São Paulo. Before the war Argentina was the principal buyer and England the second; in recent years Argentina has been first and Uruguay second.

A dehydrating plant which prepares banana flakes and dried bananas has been recently developed in Santos.

PINEAPPLES

Pineapples are also grown throughout the State but in commercial quantities principally in the area bounded by Campinas, Sorocaba, Itú, Piracicaba, and Limeira. Some production is also found in the Ribeirão Preto-Bebedouro region, as well as in the Paraíba Valley. Pineapples are usually grown on poor soils.

The three principal varieties of pineapple grown in the State are: (1) Yellow Boituva, which produces a sweet yellow fruit, averaging about 4½ pounds in weight, is considered one of the best; (2) White Pernambuco, the second most important variety, averages about 3 pounds in weight, has a good flavor, but also has thorns on the leaves; and (3) Smut Carana, grown in small quantities only, is the least desirable type produced.

Pineapples are planted in September-October and January-February and harvested principally from October through February. They are used primarily for sale as fresh fruit in the local market. In 1942, 333 short tons were exported, most of which went to Argentina, with a small quantity going to Uruguay.

The São Paulo pineapple is not so sweet as the Pernambuco pineapple, according to many authorities, and it is smaller and harder to produce than the Hawaiian. The State perhaps has possibilities of becoming a leading pineapple producer because of its good transportation system.

GRAPES

There are four principal zones of grape production in São Paulo: Jundiá-Campinas, São Roque, São Paulo-Mogí das Cruzes, and Salto. The first two regions are the most important, producing about 80 percent of the total State production. Grapes are rarely interplanted with other crops. They are planted for the most part in mountainous regions where the climate, due to the high altitude, approximates a temperate climate. São Paulo is probably the only section in the world that could put grapes on the world market during January and February. At present no grapes are exported. During 1942, about 1,000 short tons were imported, 42 tons from the United States and most of the rest from Argentina.

The principal types of table grapes are White Niagara, Red Niagara, White Diamond, Golden Queen, Black National, and Muscatel. They are harvested in January through March. The wine grapes are Corbina (Seibel 2, *Vitis licencum*) and Isabel (*Vitis labrusca*). Most São Paulo grapes are used for wine production, all of which is consumed locally.

OTHER FRUITS

A number of other fruits, including figs, avocados, pears, mangoes, peaches, guavas, and papayas, are produced in commercial quantities, principally for the domestic market. No doubt additional quantities of these fruits are grown on farms throughout the State for farm consumption and for sale in nearby local markets. Strawberries are produced commercially in the vicinity of the city of São Paulo.

Vegetable Production

According to officials of the Secretariat of Agriculture, there were in the 1942-43 season approximately 96,000 acres planted to vegetables in the State. The principal producing regions are: Jundiá-

Campinas, São Paulo-Mogí das Cruzes, São Roque-Sorocaba, and Campos do Jordão-Pindamonhangaba-Taubaté in the Paraíba Valley. Most of the vegetables are sold in the city of São Paulo, but large quantities are shipped from the Paraíba Valley to Rio de Janeiro. Between 10,000 and 15,000 producers are thought to be located within 50 miles of the city of São Paulo. They are largely of foreign nationality or first-generation Brazilians. Japanese constitute the largest group; Portuguese, Spanish, and Italians make up the rest. In general, the Japanese produce those types which are most difficult to grow.

Based on volume, the principal vegetables produced are tomatoes, cabbage, carrots, lettuce, cauliflower, broccoli, and lentils. The more expensive vegetables, such as artichokes, asparagus, broccoli, and carrots, are almost all consumed in the city of São Paulo. Rio de Janeiro and Santos usually consume cheaper kinds of vegetables produced in São Paulo and frequently those of inferior quality. Some regions, although producing a great variety of vegetables, specialize in one or two. For example, Campos do Jordão specializes in carrots, Pindamonhangaba in tomatoes, Mogí das Cruzes in cabbage.

According to representatives of United States firms, who have been studying the possibilities of producing vegetables for canning in this region, tomatoes and green peas apparently offer the best opportunities. They are relatively easy to produce and handle for canning purposes. Of the nationally canned vegetables on the Brazilian market, these two are by far the most important. Fruits, jellies, meat, and fish make up the bulk of the canned foods produced in Brazil.

The principal tomato-producing regions of the State are Jundiá-Campinas, São Paulo-Mogí das Cruzes, and Monte Alto. According to the Secretariat of Agriculture, there were in 1942-43 about 1,200 acres planted to tomatoes. Production amounted to 130,000 boxes. Practically all the tomatoes are consumed within the country, largely in the cities of São Paulo and Rio de Janeiro.

Livestock Industry

The livestock industry, as compared with that of Argentina and the United States, is relatively undeveloped. Brahma or zebu cattle are by far the most common type of beef animal in the State. Although cattle raising is not generally significant, São Paulo is one of the principal fattening regions of Brazil. Thin cattle are driven in from the States of Goiás, Minas Gerais, and Mato Grosso to be fattened on

grass pastures, particularly in the Barretos-Rio Preto region, but also in the Noroeste zone.



FIGURE 6.—Dairy herd in the State of São Paulo, Brazil.

Practically all the cattle are grass-fattened, which doubtless accounts for the popularity in central Brazil of the Brahma cattle. In addition to fattening easily on grass, Brahmas are well adapted to climatic conditions of central Brazil. They can stand the hot weather; are not seriously affected by insects; and, although they lose weight from hoof-and-mouth disease, they rarely die from it.

The number of cattle in the State of São Paulo varies with the meat demand, since they are brought to the fattening pastures only as feeders. Fat cattle are sold either to slaughterhouses or to *charqueadas* which make jerked beef. Prior to 1943 sizable quantities of meat were exported, but exports have dropped off greatly because of Federal Government restrictions and the apparent unwillingness of cattlemen to sell their cattle at present ceiling prices.

The principal fluid-milk-producing region in the State is in the Paraíba Valley, between the cities of São Paulo and Rio de Janeiro. Eighty-one percent of the milk consumed in the city of São Paulo comes from this region. In addition, considerable quantities of milk are shipped from this valley to the Rio de Janeiro market. The Paulista railway zone supplies 9 percent, the Mogiana 6, and the Bragançina 4 percent of the fluid milk used in the State.

According to the State Secretariat of Agriculture, in 1940 there were about 971,000 milk cows in the State, most of which were Holsteins. The total probably includes many cows used exclusively for raising calves. Many producers follow the practice of milking a cow in the evening, then letting the calf run with it until 10 or 11 o'clock the next

morning. In the principal milk-producing zones, however, the cows are milked regularly twice a day.

During 1942 there were 95,441,000 quarts of milk sold in the State. Of this number about 58,076,000 quarts were sold in the city of São Paulo.

During 1943, the following quantities of dairy products were produced in the State:

	1,000 pounds
Sweetened condensed milk-----	30
Condensed milk-----	4, 935
Milk meal-----	192
Powdered milk-----	1, 050

In 1942, about 1,500 short tons of butter were produced in the State. It is made in small creameries and on farms. According to the Federal Ministry of Agriculture, 173 tons of cheese, 26 of cottage cheese, and 207 tons of cream cheese were also produced in that year. São Paulo does not supply all its own needs for cheese but imports sizable quantities from other Brazilian States, as well as from other countries.

Poultry is produced throughout the State, with heaviest production in the Campinas-Itú areas and in the lower Mogiana, particularly near the Minas Gerais border, and in the Araraquarense. According to the Secretariat of Agriculture, poultry numbers approximate a total of 11,000,000. In 1942, 3,054,000 birds were sold for meat in the city of São Paulo.

About 10 percent of the eggs in the State are produced on commercial poultry farms. Of the commercial chicken flocks, 80 percent are White Leghorns, 18 Rhode Island Reds, and 2 percent other breeds. Because of the higher production of the commercial flocks, they represent less than 10 percent of the total number of birds in the State. In 1942, more than 12,000,000 dozen eggs were sold in the city of São Paulo. Of this number, 2,000,000 dozen were produced on commercial farms and were probably classed as Grade A eggs. The rest were country eggs, of which slightly more than a million dozen were classified by a cooperative and sold on grade.

There are only a few commercial hatcheries; since they are not under Government supervision, the number of chicks sold each year is not known. In the past, United States commercial hatcheries have been able to ship pedigreed chicks to São Paulo and sell them at lower prices than those in the local market. There is one egg-drying plant in the State. The pan-drying method is used to prepare dried whites and yolks. The plant equipment was moved from China to Brazil before the Japanese invasion.

Approximately 200,000 head of hogs are killed annually in the State. The great majority are of the lard type. Most of those entering the São Paulo

city market come from the Alta Sorocabana region of São Paulo, central and northern Paraná, and southern Minas Gerais. These hogs are permitted to run in the woods and forests. A short time before being sold to the slaughterhouse they are fattened by running them in cornfields, where they "hog down" the corn.

The most common types are considered national breeds, such as Canastrão, Canastra, and Piáu. There are also a few herds of Duroc-Jersey and Poland China.

Prospects for Future Development

Growers of São Paulo have made substantial contributions to the United Nations food requirements but if given proper encouragement could produce even greater quantities. The State Secretariat of

Agriculture has a system of "county agents"—regional agronomists—stationed throughout the State. These men could encourage the production of needed products. The State is fairly covered with a network of railroads, and there are trade facilities for handling increased quantities of products. One of the principal limiting factors is price. The price level in Brazil has increased considerably during the past 4 years, but the prices of some agricultural products have not kept pace. If greater quantities of peanuts, for example, were desired, growers would have to be guaranteed a price somewhat above the present one.

São Paulo growers, as well as officials of the Secretariat of Agriculture, want to do more to help with the international food program. They need guidance and cooperation from groups that are directly responsible for supplying foodstuffs to people who need them.

Food in Continental Europe*

The outlook for local food supplies and requirements in continental Europe definitely indicates a large import need for the remaining months of the current consumption year August 1, 1944, to July 31, 1945, and for the subsequent 12-month period. The Allies face a situation which holds no prospect of early improvement.

Continental Europe's supply of food from domestic sources in the consumption year 1945-46 will be the smallest since the outbreak of war. The decline from the 1944-45 level may amount to from 5 to 10 percent for the Continent as a whole.

These conclusions result from a number of factors. The cumulative effect over the war years of the

shortages in agriculture of manpower, fertilizers and manure, draft power, and machinery will be reflected by crop yields in 1945 more than in any previous year. In the past 2 years the curtailment in the supply of nitrogen for commercial fertilizers has become far more drastic in a number of countries, and the shortage of phosphate fertilizers goes into its sixth crop year. Furthermore, the impact of military operations upon general production and transport has had a marked influence upon the output of food and its effective utilization. Some agricultural land in combat areas has been rendered unusable for immediate production; some livestock has been displaced and destroyed; transport has been disorganized (affecting production as well as distribution); and the controls over utilization of farm

*Summary of a recent report issued by the Office of Foreign Agricultural Relations.

FOREIGN AGRICULTURE

HALLY H. CONRAD, EDITOR

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products, deliveries from farms, and distribution among the urban consumers have generally undergone a considerable deterioration. Food-processing factories have been damaged or destroyed. From Italy and the Netherlands reports state that none of the sugar factories found in the areas liberated before April 1 were in workable condition. The effects of some of these developments will outlast 1945.

In eastern Europe, once a food surplus area, special factors connected with military operations and occupation as well as substantial economic and social changes also will tend to reduce production of food for some time to come. The new governments that have been set up in these regions are determined to carry out certain measures and to institute certain controls which cannot but affect adversely agricultural productivity for an extended period of transition. General administrative disorganization; the extensive land reforms in process of accomplishment in Poland, Hungary, and even Rumania and Yugoslavia; and related measures of confiscation or redistribution of farm machinery and livestock will reduce 1945 production to a marked degree.

Winter sowings in those areas were reported very much below those of previous years and also below the acreage planned. There will hardly be a genuine surplus from the 1945 crops in these regions; and little, if any, is likely to be available to central- or west-European areas.

Reports from other parts of the Continent also are unfavorable. Winter sowings in western Europe, and also central Europe, were below those of last year, and there are no indications that the deficit has been fully made up this past spring. In fact, conditions of active warfare and attendant circumstances created further impediments to farm operations over wide European areas, combat zones as well as hinterland.

Estimates, country by country and for the Continent as a whole, indicate that in terms of ultimate food energy continental Europe's production of food for consumption in 1944-45 was about 5 percent below the average for the middle thirties, when the population was from 3 to 4 percent smaller than it is at present. This 1944-45 level of production in terms of ultimate food energy, it should be noted, includes the gains in food calories that resulted from the wartime diversions of production and crop utilization from feed to food. And these gains meant a considerable deterioration in the composition of the food consumed, such as the reduction in the intake of foodstuffs of animal origin and of fats, the admixture of feed grains to bread cereals, and

the high flour extraction, which in some countries is well over 90 percent.

Considering this level of production, the increase in population, and the drastic curtailment of imports compared to the pre-war period, it may be estimated that the per capita consumption of food in continental Europe thus far in 1944-45 has been at a rate around 85 percent of the pre-war level, with a substantial deterioration in the qualitative composition of the diet. An average consumption of around 85 percent of the pre-war per capita intake of energy, with a large part of the population (mostly the rural people) scarcely affected by the reduction in total supplies, indicates that there are millions of people who subsist on as little as three-fourths, two-thirds, or even one-half of their pre-war calories. These millions, in the main, must live on the legal rations for "normal consumers." Even if a liberal allowance is made for the consumption of unrationed foodstuffs, and with rations fully available, the "normal consumer" diet does not provide more than 1,750 calories per adult in Belgium, 1,600 in Norway, below 1,500 in France, and even less in some other areas. This is from 50 to 70 percent of the pre-war energy intake by this "normal consumer" category, which generally includes not only old people and white-collar workers but also some manual laborers.

This situation in a large segment of the continental European population shows that total supplies do not tell the whole story—distribution is equally important. A relatively moderate further decline in total food supplies must result in a disproportionately larger decline in the supply available for the broad mass of the urban population in most areas. The supplies which can be brought under control by the authorities and can be distributed effectively and equitably, in relation to requirements, determine, in large measure, the import needs of those countries.

In view of these circumstances, especially the prospective decline in the production of food for the consumption year 1945-46 and a net deterioration in the effectiveness of agricultural and distribution controls, import requirements for a liberated continental Europe in 1945-46 will be large. Considering these requirements, not in terms of probable effective demand or availability of supplies and shipping, but only in terms of quantities necessary to bring about some improvement in liberated countries and to prevent large-scale starvation in enemy territory, a total of about 12 million short tons of food would be needed for the Continent in 1945-46. This total could consist largely of wheat, but should also include substantial quantities of fats and animal-protein foods, as well as sugar.